CLAIMS

I claim:

1. A controlled motion actuator system, comprising:

a movable element;

at least a first wire whose length changes with twist applied thereto, said at least first wire having one end attached to said movable element;

a first rotary motion shaft attached to a second end of said at least first wire, such that rotation of said shaft generates a twist in said at least first wire, thereby changing its length and adjusting the position of said moveable element; and

a controller for providing input control signals to rotate said first rotary motion shaft such that said position of said movable element is determined in accordance with said controller.

2. A controlled motion actuator system according to claim 1 and also comprising:

a second wire having one end thereof attached to said movable element in a sector generally opposite to that where said at least first wire is attached; and

a second rotary motion shaft attached to a second end of said second wire such that rotation of said second shaft generates a twist in said second wire, thereby changing the length of said second wire;

wherein the position of said movable element is determined by the cooperative action of said twists applied to said at least first wire and to said second wire.

3. A controlled motion actuator system according to claim 2 and wherein said controller provides input control signals to rotate said at least first rotary motion shaft and said second rotary motion shaft, such that said twists applied to said at least first wire and said second wire are in opposite directions.

4. A controlled motion actuator system according to claim 3 and wherein said rotations generated by said controller are of equal magnitude and opposite sign.

5. A controlled motion actuator system according to claim 4 and wherein said rotations are operative to increase the linearity of motion of said movable element as a function of said controller inputs, compared to the linearity of the change in length of a single twisted wire as a function of applied twist angle of rotation.

6. A controlled motion actuator system according to claim 1 and also comprising at least two additional wires, each having one end thereof attached to said movable element in different sectors to that in which said at least first wire is attached, and whose lengths are adjusted by twists applied thereto, and wherein the position of said movable element is determined by the cooperative action of twists applied to said at least first wire and to said at least two additional wires.

7. A controlled motion actuator system according to claim 6 and wherein said at least two additional wires are two additional wires such that the position of said movable element is determined in two dimensions.

8. A controlled motion actuator system according to claim 1 and also comprising a spring having one end thereof attached to said movable element in a sector generally opposite to that where said at least first wire is attached, and wherein the position of said movable element is determined by a twist applied to said at least first wire.

9. A controlled motion actuator system according to claim 1 and also comprising:

a second wire, whose length changes with twist applied thereto, and having one end thereof attached to said movable element in a sector generally opposite to that where said at least first wire is attached; and

a spring having one end thereof attached to said movable element in a sector generally opposite to those where said at least first wire and said second wire are attached,

wherein the position of said movable element is determined by the cooperative action of twists applied to said at least first and to said second wires operating against the action of said spring.

10. A controlled motion actuator system according to any of the previous claims and wherein said position of said movable element is reached by a predetermined motion path of said moveable element, and wherein said motion path is predetermined by said controller.

11. A controlled motion actuator system according to any of the previous claims 1 and 8 and wherein said first rotary motion shaft is driven by an electric motor.

12. A controlled motion actuator system according to any of the previous claims 2 to 7 and 8 to 10, and wherein a least one of said rotary motion shafts is driven by an electric motor.

13. A controlled motion actuator system according to either of claims 11 and 12 wherein said electric motor is a stepping motor.

14. A method of providing controlled motion to a moveable element, comprising the steps of:

providing a movable element whose position is to be controlled;

attaching to said movable element one end of at least a first wire whose length changes with twist applied thereto;

attaching at least a first rotary motion shaft to a second end of said at least a first wire, the rotation of said shaft being controlled by input signals from a controller; and

applying a controlled twist to said first rotary motion shaft at said second end of said at least first wire, such that the position of said moveable element is adjusted in accordance with said controller.

15. The method of claim 14 and also comprising the steps of:

attaching to said movable element a second wire whose length changes with twist applied thereto, said second wire having one end thereof attached to said movable element in a sector generally opposite to that where said at least first wire is attached;

attaching a second rotary motion shaft to a second end of said second wire, the rotation of said shaft being controlled by a controller; and

applying a controlled twist to said second rotary motion shaft at said second end of said second wire, such that the position of said movable element is determined by the cooperative action of twists applied through said rotary motion shafts to said at least first wire and to said second wire.

16. The method of claim 15 and wherein said twist applied to said at least first wire and said twist applied to said second wire are in opposite directions, and wherein said controller applies rotations of opposite sign through said rotary motion shafts to said at least first wire and said second wire to control said position of said moveable element.

17. The method of claim 15 and wherein said rotations generated by said controller are of equal magnitude and opposite sign.

18. The method of claim 17 and wherein said rotations are operative to increase the linearity of motion of said movable element as a function of said controller inputs, compared to the linearity of the change in length of either of

said at least first and said second twisted wires as a function of twist angle of rotation applied to either.

19. The method of any of claims 15 to 18, and also comprising the steps of:

attaching to said movable element in at least one sector generally opposite to those where said at least first wire and said second wire are attached, a first end of at least one additional wire whose length changes with twist applied thereto; and

applying a twist to a second end of said at least one additional wire;

wherein said twists applied to said at least first wire, to said second wire, and to said at least one additional wire are adjusted to position said movable element in at least two dimensions.

20. The method of claim 19 and wherein the magnitude and direction of said twists are such as to increase the linearity of motion of said movable element as a function of said controller inputs, compared to the linearity of the change in length of any of said at least first, said second and said at least one additional wire as a function of twist angle of rotation applied to any of them.